

What is claimed is:

1. A fluid dynamic bearing motor comprising:
 - a rotor;
 - a stationary sleeve disposed about a portion of the rotor and mounted to a base;
 - a stator mounted to the stationary sleeve;
 - a fluid dynamic bearing between the rotor and stationary sleeve; and
 - a limiter for restricting axial movement of the rotor with respect to the stationary sleeve.
2. The fluid dynamic bearing motor of claim 1, wherein a portion of the rotor cooperating with the limiter comprises a shaft rotating within the stationary sleeve.
3. The fluid dynamic bearing motor of claim 2, wherein the rotor further comprises:
 - a hub rotatably supported by the shaft; and
 - a rotor magnetic assembly affixed to the hub.
4. The fluid dynamic bearing motor of claim 3, wherein the rotor is adapted to support at least one disk.
5. The fluid dynamic bearing motor according to claim 4, wherein the limiter comprises an element that protrudes into or from a surface of the hub.
6. The fluid dynamic bearing motor according to claim 5, wherein the element is selected from a group consisting of a screw, a pin, a block, and a flange.
7. The fluid dynamic bearing motor according to claim 6, wherein the limiter comprises an element that protrudes from a stationary member and into a recess in the rotor.

8. The fluid dynamic bearing motor according to claim 5, wherein the element comprises a pin that protrudes from the stationary sleeve and into a recess in the shaft.
9. The fluid dynamic bearing motor according to claim 5, wherein the element comprises a screw that protrudes from the base and into a recess in an outer diameter of the hub.
10. The fluid dynamic bearing motor according to claim 5, wherein the element comprises a block that protrudes from the base and into a recess in an outer diameter of the hub.
11. The fluid dynamic bearing motor according to claim 10, wherein the block is trapezoidal in shape.
12. The fluid dynamic bearing motor according to claim 5, wherein the element comprises a flange that extends from the stationary sleeve and into a recess in the shaft.
13. The fluid dynamic bearing motor according to claim 12, wherein the recess in the shaft is defined by a portion of the shaft having a decreased diameter that allows the flange to extend over a lip on the shaft.
14. The fluid dynamic bearing motor according to claim 13, wherein a capillary seal is defined between the flange and the stationary sleeve.
15. The fluid dynamic bearing motor according to claim 14, wherein the capillary seal is a centrifugal capillary seal.
16. A fluid dynamic bearing motor comprising:
 - a stator;
 - rotor means disposed proximate the stator, for rotating upon the stator being energized;

bearing means, between said stator and rotor means, for enabling the rotor means to rotate relative to the stator; and

limiter means for restricting axial movement of the rotor means with respect to the stator.

17. The fluid dynamic bearing motor of claim 16, wherein the rotor means further comprises:

a shaft;

a hub rotatably supported by the shaft; and

a rotor magnetic assembly affixed to the hub.

18. The fluid dynamic bearing motor according to claim 17, wherein the limiter means comprises an element that protrudes into or from a surface of the hub.

19. The fluid dynamic bearing motor according to claim 18, wherein the element comprises at least one of the following: a screw, a pin, a block, or a flange.

20. A disk drive comprising:

a hub for rotatably supporting at least one disk;

a shaft affixed to and disposed through the center of the hub;

a stationary sleeve disposed about the shaft;

a fluid dynamic bearing between the shaft and the sleeve;

a stator affixed to the sleeve;

a magnet assembly affixed to the hub; and

a limiter for restricting axial movement of the hub with respect to the sleeve.

21. A fluid dynamic bearing as claimed in claim 20 wherein the limiter comprises a step on an end of the shaft adjacent a counterplate supported from the sleeve.

22. A disk drive as claimed in claim 21 wherein the step is integral with the shaft.
23. A disc drive as claimed in claim 21 wherein the step comprises a circular disk fixed to an end of the shaft.
24. A disc drive as claimed in claim 23 wherein the magnet is offset from the stator to provide an axial bias to the shaft to aid in supporting the axial location of the shaft.
25. A disc drive as claimed in claim 20 wherein the sleeve is supported from a base, and further comprising a top cover, and a screw threaded through the top cover into contact with an upper surface of the shaft, the threading of the screw being established to define a limit of axial travel of the shaft and the hub relative to the base and the sleeve.
26. A disc drive as claimed in claim 25 wherein the magnet is offset from the stator to provide an axial bias to the shaft to aid in supporting the axial location of the shaft.
27. A fluid dynamic bearing motor as claimed in claim 1 wherein the rotor includes a shaft extending through a bore defined by the sleeve, and the limiter comprises a U-shaped element extending into a groove in the shaft and axially restrained by the sleeve.
28. A fluid dynamic bearing motor as claimed in claim 27 wherein the limiter is further axially restrained by a counterplate supported from the sleeve and having a surface facing an end surface of the shaft.
29. A fluid dynamic bearing motor as claimed in claim 26 wherein the limiter is a split ring comprising first and second sections, the sections being radially inserted into a groove in the sleeve and restrained in place axially by the sleeve.

30. A fluid dynamic bearing motor as claimed in claim 26 wherein the limiter comprises a ring supported and extending partially into a groove in the shaft and further extending partially radially into a groove in the sleeve to capture the shaft against axial movement relative to the sleeve.
31. A fluid dynamic bearing motor as claimed in claim 30 wherein the groove in the sleeve is similar in cross section to the an external surface of the ring, the ring being compressible into the groove so that the shaft may be inserted into the sleeve.
32. A fluid dynamic bearing motor as claimed in claim 26 wherein the limiter comprises a U-shaped ring extending partially into a groove in the shaft and further extending partially radially into a groove or opening in the sleeve to capture the shaft against axial movement relative to the sleeve, an opening in the U-shaped ring being aligned with a recirculation path in the sleeve.
33. A fluid dynamic bearing motor as claimed in claim 31 wherein the ring is circular or rectangular in cross section.
34. A fluid dynamic bearing motor comprise a stationary shaft supported from a base, a sleeve supporting a hub which in turn is adapted to support one or more discs for rotation, grooves on one of the facing surfaces of the shaft or sleeve, fluid in a gap defined between the shaft and sleeve for supporting rotation of the sleeve around the shaft, and a limiter supported from the sleeve and extending beneath a shoulder of the stationary shaft for limiting axial travel of the sleeve relative to the shaft.
35. A fluid dynamic bearing motor as claimed in claim 34 wherein a surface of the shoulder of the shaft axially diverges from a surface of the limiter, the gap between the sleeve and the shaft communicating with the gap between the shoulder and the limiter so that a reservoir may be defined between the limiter and the shoulder of the shaft.

36. A fluid dynamic bearing motor as claimed in claim 35 wherein the limiter is closely adjacent a surface of the base so that a seal is defined between the reservoir and the limiter and the sleeve and the limiter to prevent any loss of fluid from the reservoir into surrounding atmosphere.
37. A fluid dynamic bearing motor as claimed in claim 35 further including a limiter shield axially displaced from the shoulder of the shaft and the limiter supported from the shaft, the limiter shield being supported from the sleeve and rotating therewith to further reliably seal the fluid bearing from the outside atmosphere.
38. A fluid dynamic bearing as claimed in claim 37 wherein the limiter shield includes an axial surface which axially diverges from a surface of the limiter in order to establish a fluid reservoir communicating with a gap of the fluid bearing.